A SURVEY FOR SOUTHERN REDBELLY DACE (*Phoxinus erythrogaster*) IN THE BIG SIOUX RIVER BASIN OF EASTERN SOUTH DAKOTA

By

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Submitted to:
South Dakota Department of Game, Fish and Parks
Wildlife Diversity Small Grants Program 2008
Pierre, South Dakota

EXECUTIVE SUMMARY

No southern redbelly dace were found in a survey of six candidate stream sites within the Big Sioux River Basin in South Dakota. Selection of candidate sites was based upon broad-scale habitat features and local habitat features characteristic of streams inhabited by southern redbelly dace. Southern redbelly dace are a rare species and may not have been detected, although present in the stream. High water levels during sampling may have affected the ability to collect the species. This survey supports that southern redbelly dace are rare in South Dakota and are in need of conservation as proposed by the state Wildlife Action Plan.

INTRODUCTION

The southern redbelly dace is a rare fish in the state of South Dakota and is considered critically imperiled in the state according to the South Dakota Natural Heritage Program (2008). The species is also classified as a species of greatest conservation concern in the state Wildlife Action Plan, and is listed in the Regional Forester's Sensitive Species List in Region 2 (Stasiak 2007), which includes the state of South Dakota. Within the western edge of the species' range (i.e., USDA Forest Service Region 2), southern redbelly dace are found in small, scattered populations (Stasiak 2007). One of these populations occurs in the Big Sioux River watershed (Hatch et al. 2003). A subpopulation of southern redbelly dace was recently documented in a tributary to the Big Sioux River within South Dakota (Springman and Banks 2005).

Southern redbelly dace are rare in South Dakota because they are on the edge of their range, and suitable habitat is uncommon within the state. Southern redbelly dace inhabit small headwater streams with clear-water, that are groundwater fed, have heavy overhanging vegetation or undercut banks, and have substrates consisting of sand or gravel (Stasiak 2007). Water flow is typically moderate and year round. Suitable habitat is limited within eastern South Dakota making the southern redbelly dace indicative of, and dependant on, a unique habitat in the state. Land use changes have caused southern redbelly dace populations and distribution to decline in other states within its western range (Stasiak 2007). Knowledge of the distribution of the southern

redbelly dace and its habitat are essential to the conservation of this species in South Dakota to prevent possible extirpations due to land use changes such as urbanization, channelization, and riparian vegetation removal.

The goal of the state Wildlife Action Plan is to conserve rare and imperiled species, however knowledge of the occurrence and distribution of southern redbelly dace in South Dakota is lacking. Since the discovery of the southern redbelly dace in South Dakota by Springman and Banks (2005), another subpopulation was discovered in a small headwater tributary close to the city of Sioux Falls in 2007 (Wall, unpublished data). Several tributaries to the Big Sioux River occurring in the south eastern portion of the state have similar characteristics to those where southern redbelly dace were found (Figure 1). It is very possible that more subpopulations of southern redbelly dace inhabit these streams. The purpose of this study was to: survey streams likely to contain southern redbelly dace; and provide information to increase knowledge of the status and distribution of southern redbelly dace within the state of South Dakota necessary to conserve the species in accordance with the goals of the state Wildlife Action Plan.

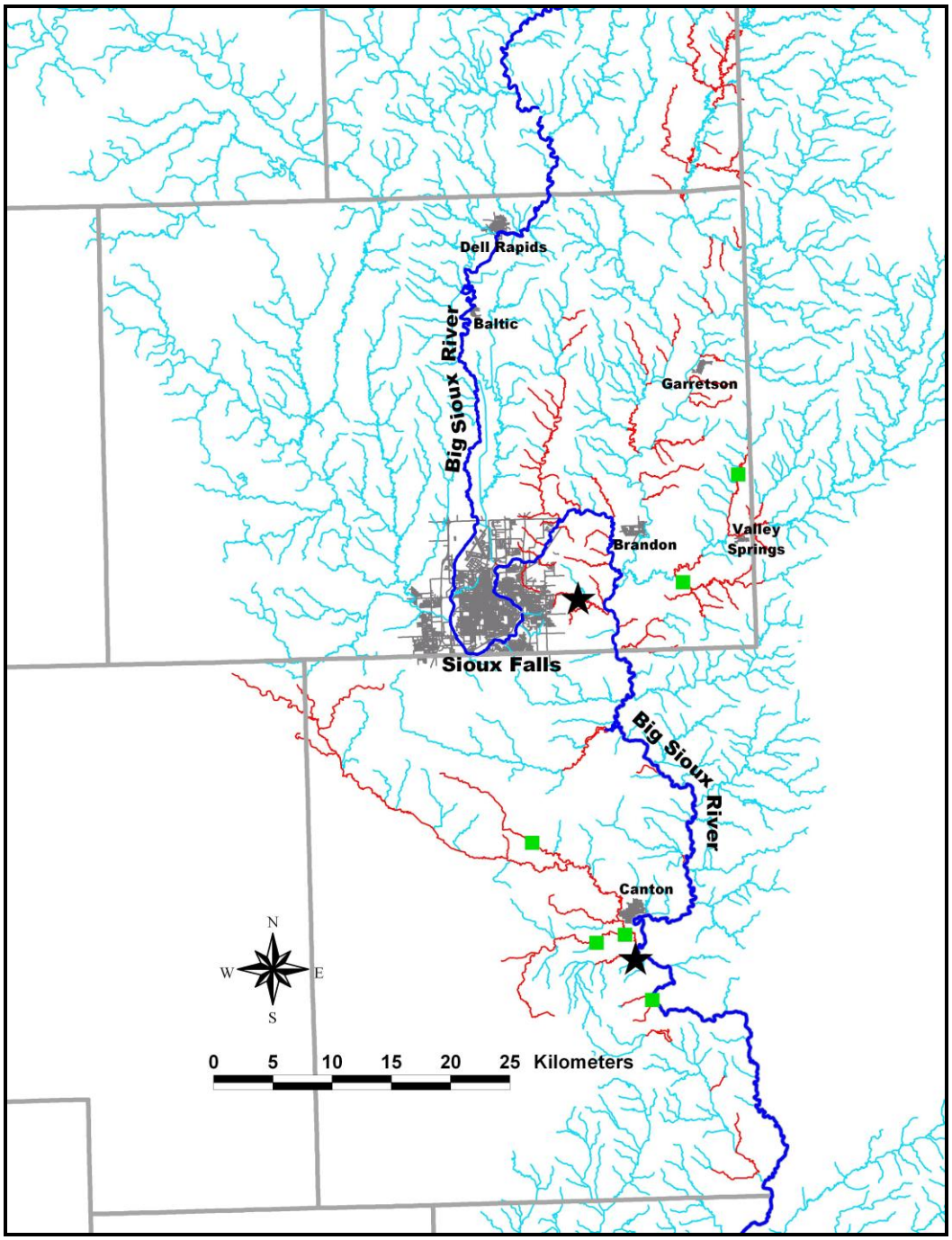

Figure 1. Sites surveyed for southern redbelly dace (green squares). Streams colored red represent stream segments with high groundwater potential that were predicted to have potential to be inhabited by southern redbelly dace. Stars on the map represent locations where southern redbelly dace have been found in South Dakota. The northern most location was discovered by the author (Wall) in 2007, and the southern most location was discovered by Springman and Banks (2005).

METHODS

Site selection

According to Stasiak (2007), southern redbelly dace are found in small streams with stable flows that are maintained by groundwater input. A GIS model developed by Wall et al. (2001) that models groundwater input to streams using surface geology and slope was used to predict streams with high potential for groundwater that should maintain perennial flow, and thus be more likely to be inhabited by southern redbelly dace. Several stream segments within the vicinity of known records of southern redbelly dace were shown to have a high potential for groundwater input (Figure 1). A reconnaissance of potential stream segments was conducted to determine reaches with suitable local habitat features associated with southern redbelly dace presence, which include clear water, heavy overhanging vegetation or undercut banks, and substrates consisting of sand or gravel (Stasiak 2007). Six candidate sites were chosen for sampling within the Big Sioux River Basin that appeared to have the most favorable habitat conditions suitable for southern redbelly dace of the over 50 potential sites visited during the reconnaissance survey.

Field Sampling

Sites were accessed by public access points (i.e., site at Newton Hills Park), and by landowner permission. All suitable habitat within several stream reaches were sampled at each site. A stream reach was defined as a length of stream 40 mean stream widths (distance from bankfull to bankfull), and is a standard length of stream used to sample fish populations in other SD Game, Fish and Parks

surveys (e.g., Wall and Thomson 2007, Burgess and Shearer 2008). Fish were seined using a bag seine of 9.1m long x 1.2m deep, with 4.7 mm bar-measure mesh. Each fish species captured was recorded at each site. A brief description of habitat features was also recorded. All fish were released live on site.

RESULTS

No southern redbelly dace were found. Several fish species were found with species richness at sites ranging from 7 to 18, with an average species richness of approximately 14 (Table 1). A description of habitat conditions for each sampled site follows.

Table 1. Location and fish found at each sample site (1 = species found during sampling; 0 = species not found at site during sampling).

	SITE 1	SITE 2	SITE 3	SITE 4	SITE 5	SITE 6
LATITUDE	UTM 14 4824958.92	UTM 14 4795211.17	UTM 14 4794545.69	UTM 14 4802971.55	UTM 14 4789721	UTM 14 4834050.52
LONGITUDE	UTM 14 699741.2006	UTM 14 694824.5937	UTM 14 692428.8842	UTM 14 687003.0877	UTM 14 697137.1189	UTM 14 704383.441
STREAM	Four-Mile Creek	S Fk Beaver Creek	S Fk Beaver Creek	Tributary to Beaver Creek (Lincoln County)	Sargent Creek	Tributary to Beaver Creek (Minnehha County)
PLSS	101N047WSec18	098N049WSec27	098N049WSec22	099N050WSec36	097N049WSec12	102N047WSec15
Bigmouth shiner	1	1	1	1	0	1
Black bullhead	1	1	1	1	0	0
Bluegill	0	0	0	1	0	0
Bluntnose minnow	1	0	1	0	0	1
Blacknose dace	0	0	0	0	1	0
Brassy minnow	0	0	1	1	1	1
Brook stickleback	0	0	0	1	1	0
Common shiner	1	1	1	1	0	1
Common carp	1	1	0	1	0	0
Creek Chub	1	1	1	1	1	1
Fathead minnow	1	1	1	1	1	1
Flathead catfish	1	0	0	0	0	0
Golden shiner	0	0	0	1	0	0
Green sunfish	0	0	1	1	0	1
Iowa darter	0	0	0	0	1	0
Johnny darter	1	1	1	1	0	1
Orange-spotted sunfish	1	1	0	1	0	0
Northern pike	0	0	0	1	0	0
Plains topminnow	0	1	1	1	0	1
Red shiner	1	1	1	0	0	0
River carp sucker	1	0	0	0	0	0
Red horse sucker	1	0	0	0	0	0
sand shiner	1	1	1	1	0	0
Central stone roller	1	1	1	1	0	1
Tadpole madtom	0	1	1	0	0	0
white sucker	1	1	1	1	1	1

Site #1: Four-mile Creek

There was overhanging vegetation in the form of grasses, sedges and rushes, as well as some willow trees in patches along the stream. The surrounding landuse was pasture that had moderate use, and cattle were present at the time of sampling. Substrate consisted of sand and gravel, with some areas of silt and clay. There were two large riffle areas consisting of cobble and large gravel. Stream width ranged from approximately 1m wide to approximately 5m wide. Stream flow was high and water velocity also was high during sampling. Several reaches were seined. Runs were sampled, as well as numerous pools formed along outside bends and backwater pools. Conversation with the landowner revealed that the segment of stream sampled remains open for 12 months in most years, indicating a strong groundwater input to the stream.

Site #2: South Beaver Creek (Lincoln County)

There was an abundance of heavy overhanging vegetation in the form of grasses and sedges. There were also undercut banks, some as deep as 1 foot into the bank at bends. The surrounding landuse was pasture that had not been recently grazed in >1 year. Substrate consisted of sands and gravels, with some silt and clay. Stream width ranged from approximately 3m at pools to as narrow as approximately 0.5m. Pools and runs were sampled. Riffles were difficult to distinguish as water levels were high at the time of sampling. Water velocity was also high at the time of sampling.

Site #3: South Beaver Creek (Lincoln County)

There was an abundance of overhanging vegetation consisting of grasses and sedges. There were also patches of willow trees. The surrounding landuse was pastureland that was moderately grazed. Mean stream width was approximately 2m with wider pool areas and narrower riffles. There were several pool/riffle sequences. Substrate was predominately gravels with some silt. Riffles were comprised of mostly of cobble and some coarse gravel. The water was clear and flowing quite rapidly despite being shallow suggesting groundwater input to the stream.

Site #4: Tributary to Beaver Creek (Lincoln County)

Stream banks were vegetated with grasses and sedges. There were also some small trees and shrubs. There were areas of coarse substrate consisting of sand and gravel. There was overhanging vegetation and undercut banks. Surrounding landuse was moderately grazed pastureland. Mean stream width was approximately 3m wide. Several reaches were sampled, emphasizing pools.

Site #5: Sergeant Creek (Newton Hills Park)

There was an abundance of overhanging vegetation mostly in the form of trees and shrubs. The stream was heavily shaded by trees downstream of the bridge. Surrounding landuse was mixed forest and wetlands. There was a horse camp located upstream of the sample site. The stream was dry upstream, but clear water was flowing at the sample site indicating groundwater input to the stream

at the sample location. There were several shallow pools including a large pool above the bridge with submergent and emergent vegetation. There was an abundance of woody debris. The substrate consisted of sand and gravels with some silt and clay. There were many shallow riffles and areas with shallow runs. The valley walls were high downstream of the bridge, increasing in height closer to the confluence with the Big Sioux River. Several stream reaches were sampled upstream of the bridge and downstream to the confluence with the Big Sioux River.

Site #6: Tributary to Beaver Creek (Minnehaha County)

Stream banks were vegetated with grasses and sedges, with scattered trees. There were areas of coarse substrate consisting of sand and gravel. Surrounding landuse was pastureland that had not been grazed in recent years. Mean stream width was narrow with widths ranging from < 1m wide to approximately 2m. The stream banks were high and very well vegetated with grasses and herbaceous plants. Several reaches were sampled, including pools formed along outside bends.

DISCUSSION

No southern redbelly dace were found in a survey of six candidate sites within the Big Sioux River Basin in South Dakota. Selection of candidate sites was based upon broad-scale habitat features (i.e., high potential for groundwater input to the stream segment – Wall et al. 2001), and local habitat features associated with streams inhabited by southern redbelly dace (Stasiak 2007).

Water levels were high during 2008, which may have lowered sampling efficiency, although the number of species collected at each site was comparable to numbers collected in other studies of streams of similar size and habitat (e.g., Deiterman and Berry 1995, Wall et al. 2001). Because southern redbelly dace are a rare species its detection probability will be much less than that of more common species; thus the species may not be detected during sampling although it may be present in the stream (Hayer et al. 2008).

Stream segments sampled appeared to have suitable habitat for southern redbelly dace and were sampled close to tributaries known to be inhabited by the species. High water conditions, as were experienced during sampling, provide more available habitat for fish, allowing fish to spread throughout the stream, rather than concentrating where water levels are maintained. The increase in available habitat can make it more difficult to locate rare species such as the southern redbelly dace. For example, large numbers of the Topeka shiner, another rare species, were collected during sampling efforts in a dry year (2006). Upon return to the same sites the following wet year in 2007, there were far fewer fish, and in some cases no Topeka shiners (Wall unpublished data from James River Watershed Assessment, James River Water Development District, Huron, SD). Furthermore, a comprehensive survey of streams in the Big Sioux River Basin produced no Topeka shiners (Dieterman and Berry 1995); however, subsequent surveys have produced numerous streams with many Topeka shiners (e.g., Wall et. al 2001, Wall personal observation), including those

previously surveyed by Dieterman and Berry (1995). Therefore, although no southern redbelly dace were found during this survey, there is still a possibility that there may be more subpopulations inhabiting additional tributaries to those currently known.

CONCLUSION

During this survey no additional subpopulations of southern redbelly dace were found. Southern redbelly dace are a rare species and may not have been detected although present in the stream. "Absence of evidence is not necessarily evidence of absence." This survey supports that southern redbelly dace are rare in South Dakota and are in need of conservation as proposed by the state Wildlife Action Plan.

REFERENCES

Burgess, A., and J. S. Shearer. 2008. A comprehensive aquatics survey of Minnesota River tributaries. South Dakota Game, Fish and Parks, Pierre, SD.

Deiterman C. and C. R. Berry Jr. 1995. The distribution and relative abundance of fishes in the Big Sioux River, South Dakota. South Dakota Department of Game, Fish, and Parks. Federal Aid in Sport Fish restoration. Project F-15-R, Study Number 1532, Pierre, SD.

Hatch, J. T., K. P. Schmidt, D. P. Siems, J. C. Underhill, R. A. Bellig, and R. A. Baker. 2003. A new distributional checklist of Minnesota fishes, with comments on historical occurrence. Journal of the Minnesota Academy of Science 67:1-17.

Hayer C. A., S. S. Wall, and C. R. Berry Jr. 2008. Evaluation of predicted fish distribution models for rare fish species in South Dakota. North American Journal of Fisheries Management 28: 1259-1269.

South Dakota Natural Heritage Program. 2008. Rare, threatened or endangered animals tracked by the South Dakota Natural Heritage Program February 13, 2008. http://www.sdgfp.info/Wildlife/Diversity/RareAnimal.htm

Springman, D. J., and R. L. Banks. 2005. Range extension of the southern redbelly dace into South Dakota. The Prairie Naturalist 37(3):175-176.

Stasiak, R. H. 2007. Southern redbelly dace (*Phoxinus erythrogaster*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/southernredbellydace.pdf

Wall S. S., C. M. Blausey, J. A. Jenks, and C. R. Berry Jr. 2001. Topeka shiner (*Notropis topeka*) population status and habitat conditions in South Dakota streams. South Dakota State University, Brookings SD.

Wall, S. S., and S. K. Thomson. 2007. Topeka Shiner (*Notropis topeka*) Monitoring in Eastern South Dakota Streams (2004-2006). Unpublished report submitted to the South Dakota Game, Fish and Parks, Pierre, SD.